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# Overview of the Global Flash Flood Guidance System

WEATHER CLIMATE WATER  
TEMPS CLIMAT EAU



**WMO OMM**

World Meteorological Organization

Organisation météorologique mondiale

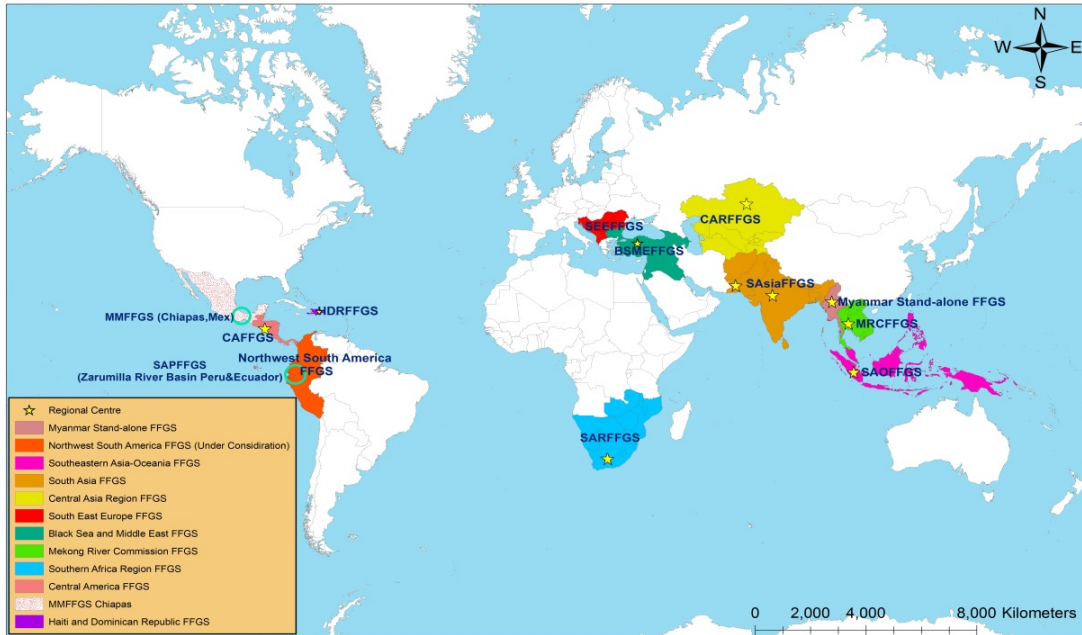
# Flash Floods – The most deadly natural (weather-related) disaster in the world

- “Recent findings of the WMO country-level survey where of the 139 countries, 105 indicated that flash floods were among the top two most important hazards around the world and require special attention”.
- “On the average, these events kill more people worldwide than any other [weather-related] natural disaster -in an average year, flash floods kill over 5,000 unsuspecting people and cause millions of dollars of property damage”(WMO 2008).



# Flash Flood Guidance System (FFGS)

## WORLD METEOROLOGICAL ORGANIZATION GLOBAL FLASH FLOOD GUIDANCE SYSTEM COVERAGE



Flash Flood Guidance System with global coverage (Resolution 21, World Meteorological Congress-XV) enhances early warning capabilities of the NMHSs, currently **covers more than 60 (sixty) countries** and **more than two billion people** around the world saving lives and decreasing economic losses.

The WMO Commission for Hydrology (CHy) jointly with the WMO Commission for Basic Systems (CBS) and in collaboration with the US National Weather Service, Hydrologic Research Center (HRC), and USAID/OFDA have developed the concept of the Flash Flood Guidance System (FFGS) with global coverage.

The concept has been endorsed by the Fifteenth WMO Congress and is being implemented through a series of regional projects with funding from USAID.

# Regional FFGS Projects

The following regional Flash Flood Guidance (FFG) projects have been implemented or are under implementation:

- **Central America FFGS** (Operational): Costa Rica (Regional Centre RC), Belize, El Salvador (Alternate RC), Guatemala, Honduras, Nicaragua, and Panama;
- **Southern Africa Region FFGS**: (Operational): Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa (RC), Swaziland, Zambia, and Zimbabwe;
- **Mekong River Commission FFGS** (Operational): Cambodia (RC), Lao People's Democratic Republic, Thailand, and Viet Nam;
- **Black Sea and Middle East FFGS** (Operational): Armenia, Azerbaijan, Bulgaria, Georgia, Israel, Jordan, Lebanon, and Turkey (RC);
- **South East Europe FFGS** (Operational): Albania, Bosnia-Herzegovina, Croatia, Moldova, Montenegro, Romania, Serbia, Slovenia, The Former Yugoslav Republic of Macedonia, and Turkey (RC);



# Regional FFGS Projects

- **Southeastern Asia-Oceania FFGS** (under implementation): Brunei Darussalam, Indonesia (RC), Malaysia, Papua New Guinea, Philippines, and Timor-Leste;
- **South Asia FFGS** (under implementation): Bangladesh, Bhutan, India (RC), Nepal, and Sri Lanka;
- **Pakistan- Afghanistan FFGS** (under implementation): Afghanistan and Pakistan (RC);
- **Central Asia Region FFGS** (Operational): Kazakhstan (RC), Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan;
- **South America Pilot FFGS** (Completed): Zarumilla River Basin (Peru and Ecuador);
- **Haiti and Dominican Republic FFGS** (under implementation): Dominican Republic and Haiti;
- **Myanmar FFG System** (under implementation).



# Objectives of the FFGS with Global Coverage

The main objectives of the Flash Flood Guidance System with global coverage are to:

- enhance NMHSs capacity to issue flash flood warnings and alerts;
- mitigate adverse impacts of hydrometeorological hazards;
- enhance collaborations between NMHSs and Emergency Management Agencies;
- generate flash flood early warning products by using state-of-the-art hydrometeorological forecasting models;
- provide extensive training, including on-line training, to the hydrometeorological forecasters;
- foster regional development and collaboration; and
- Support WMO Flood Forecasting Initiative.

# HDRFFG Regional Components

## The Participating NMHSs are to:

- prepare and issue flash flood warnings and alerts to the public and national agencies including DMA,
- provide historical and in-situ local data to the FFG system developer through the RC,
- participate in the Flash Flood Hydrometeorologist Training Programme (Steps 1-5), and
- conduct verification studies.



## The Regional Centre is to:

- Host the FFGS servers to provide products and data to the participating countries,
- collaborate with WMO and its project partners to implement flash flood hydrometeorologist training programme,
- evaluate FFG products from the regional perspective and conduct verification studies in collaboration with the participating NMHSs, and
- have good IT infrastructure and internet connection for data and product sharing.

# HDRFFGS User Interface

**HDRFFG - Haiti and Dominican Republic Flash Flood Guidance System**

Current Date: 2018-02-11 21:31 UTC    Product Date: 2018-01-09 15:00 UTC

Year: 2018    Month: 01    Day: 09    Hour: 15    REGION: REGIONAL    OPTION: MEDIAN    Su

**Product Console - Main Table**

DT	MWGHE Precipitation	GHE Precipitation	Gauge MAP	Merged MAP	ASM	FFG	IFFT	PFFT
01-hr	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view
03-hr	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view		 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view
06-hr	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view		 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view
24-hr	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view	 2018-01-09 15:00 UTC Text: view				

Composite Product: [text](#) , [CSV](#) , [CSVt](#)      SFTP data transfer (requires SFTP Client): [EXPORTS/REGIONAL/2018/01/09](#)

**Surfmet Gauge Observations at 2018-01-09 15:00 UTC**

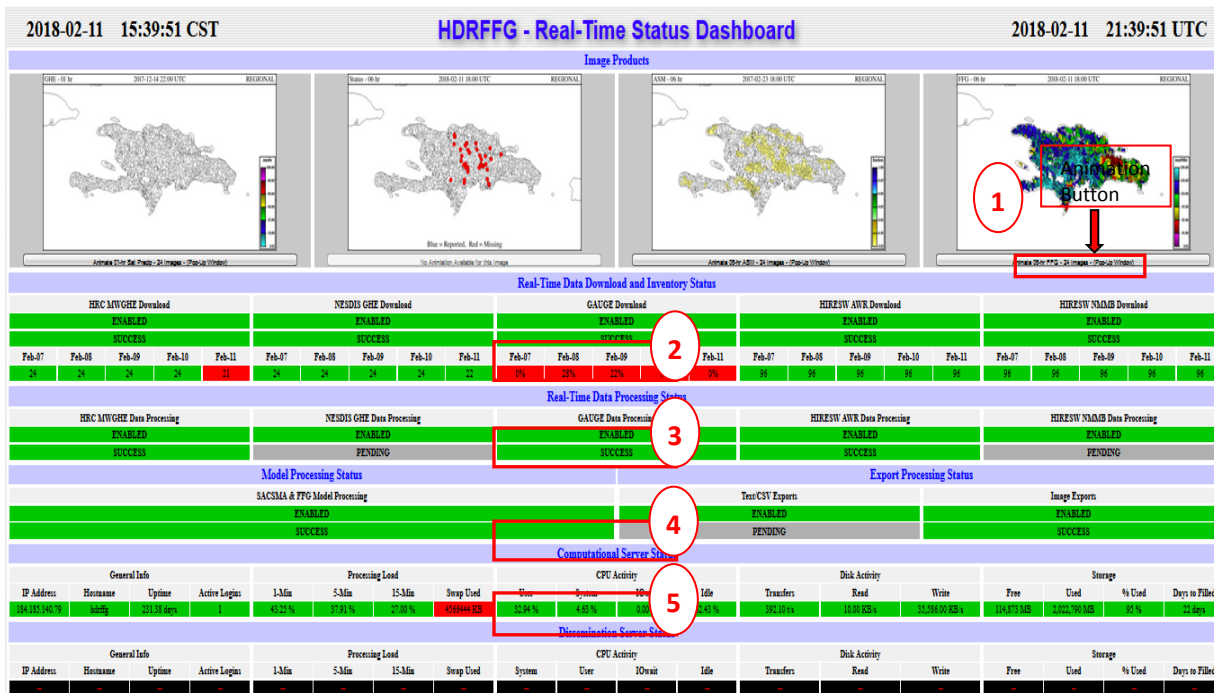
Station Identifier	Station Name	Accumulated Precipitation (mm)	Average Temperature (C)	Region	Latitude	Longitude	Elevation	Enable Precipitation Flag
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**Annotations:**

- Time Interval:** Points to the DT column in the main table.
- Products, Date and Time Selection Toolbar:** Points to the top control panel.
- FFGS Products:** Points to the FFG column in the main table.



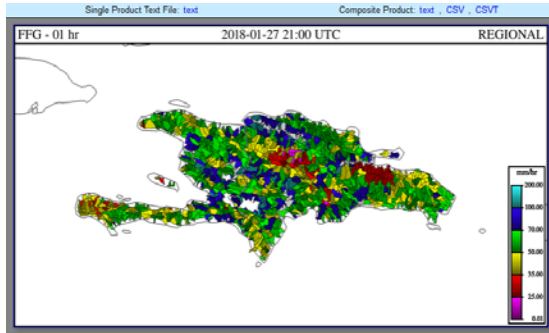
# HDRFFGS Dashboard



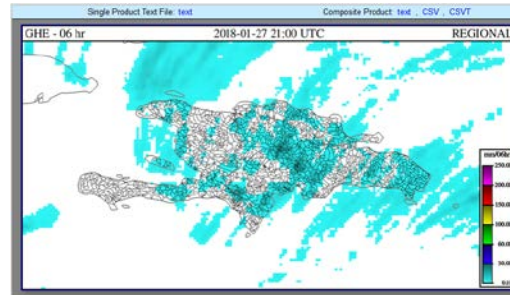
**Dashboard** is designed to monitor server processes:

- (1) Quick-look;
- (2) Real-Time data downloads and inventory status;
- (3) Real-Time Data processing status;
- (4) Computational server status; and
- (5) Dissemination server status.

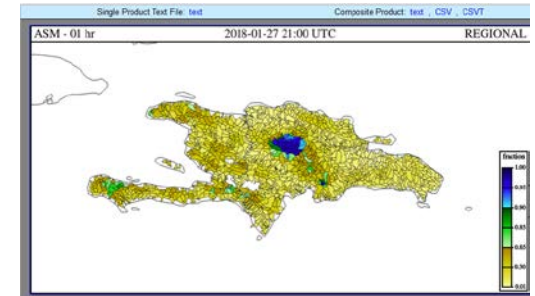
# HDRFFGS Products



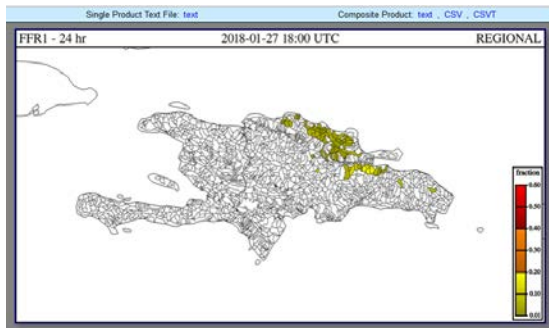
- Flash Flood Guidance for HDRFFGS.



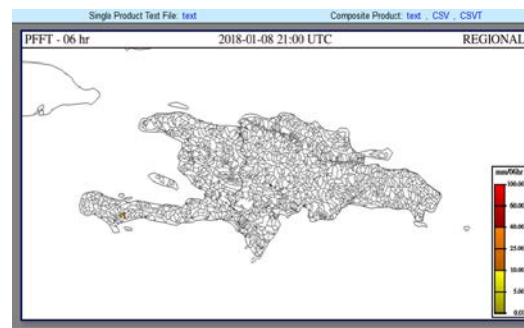
- GHE Satellite precipitation for HDRFFGS.



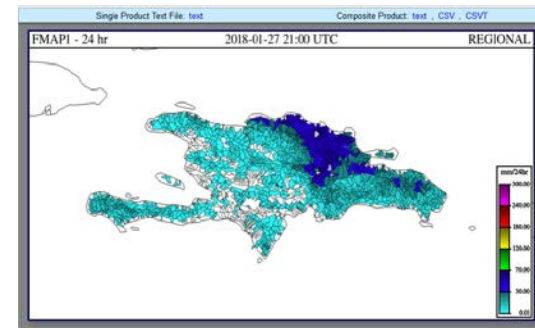
- Average Soil Moisture for HDRFFGS.



- Flash Flood Risk for HDRFFGS.

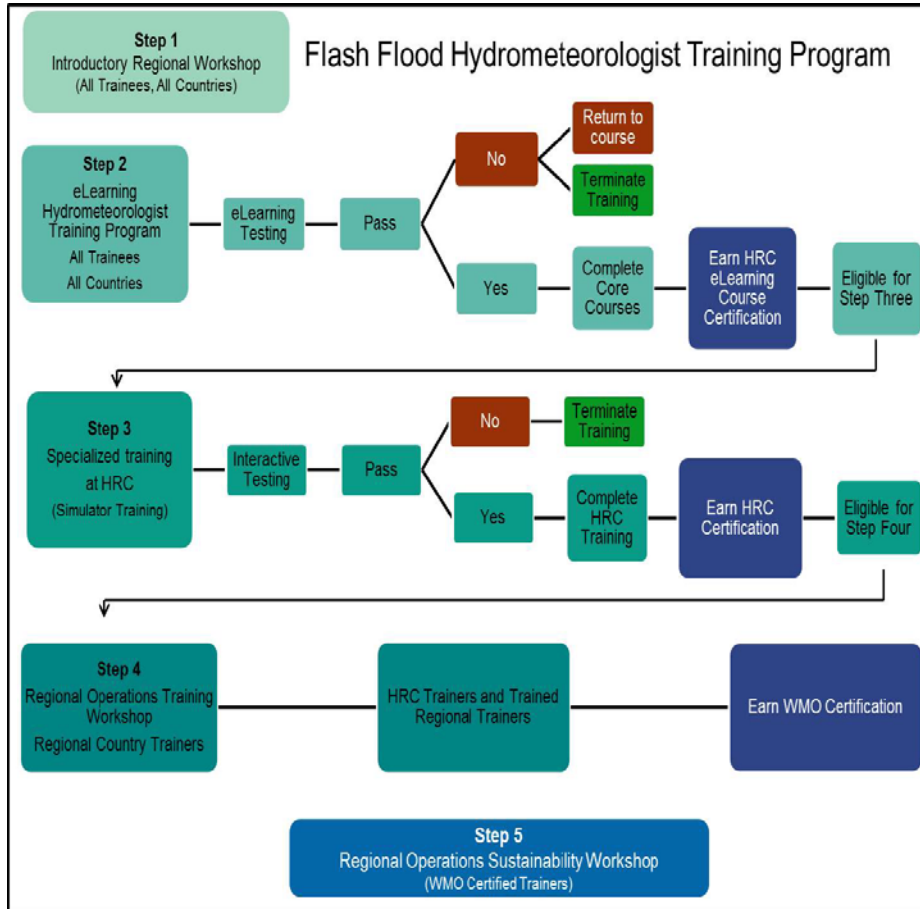


- Persistent Flash Flood Treat (PFFT) for HDRFFGS.



- Forecast Mean Areal Precipitation for HDRFFGS.

# Training Programme



**Training is an integral part of regional FFG Systems and consists of five steps:**

**Step-1:** Introductory in-country workshops and meetings such as Steering Committee Meetings;

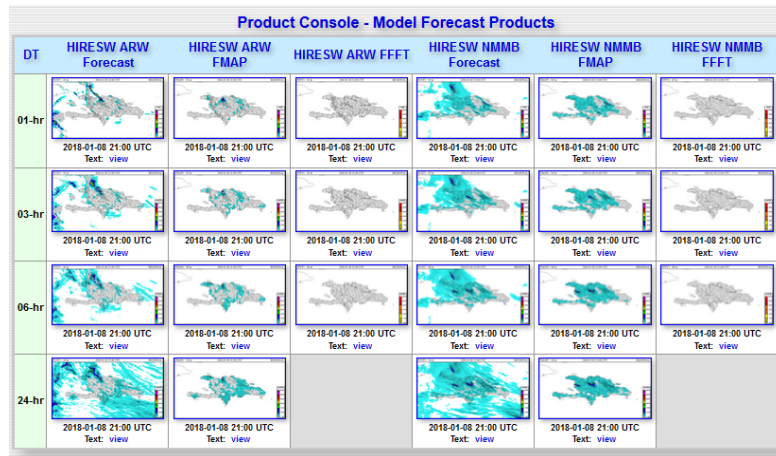
**Step-2:** On-line eLearning comprises elements of Meteorology, Hydrology, Flash Flood Guidance, GIS, and remote sensing;

**Step-3:** Advanced operations training at the Hydrologic Research Center (HRC), USA;

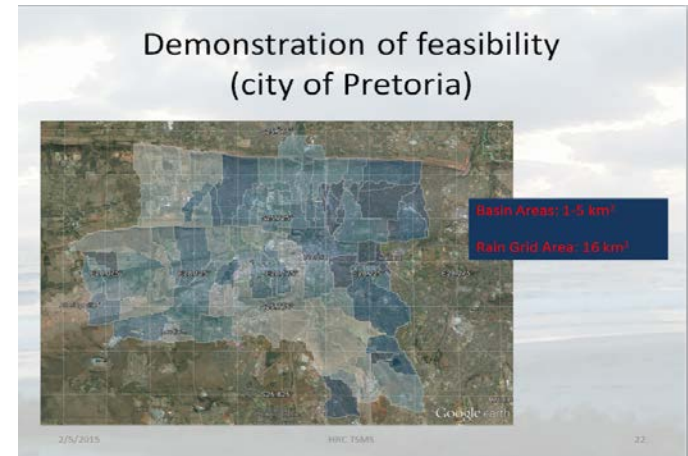
**Step-4:** Regional operations training workshop toward qualification of WMO flash flood trainer certificate;

**Step-5:** Regional operation sustainability workshop provided by the WMO certified trainer.

# FFGS Advances

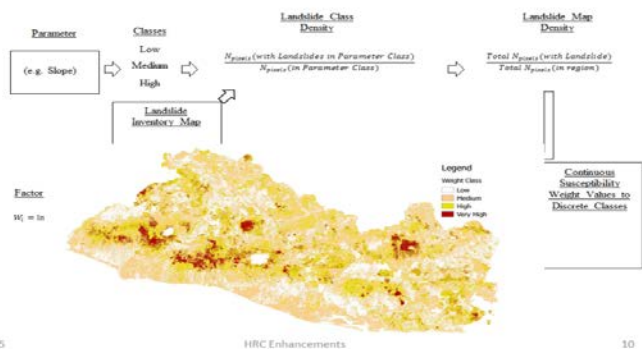


Multi-NWP Model ingestion (HDRFFGS)



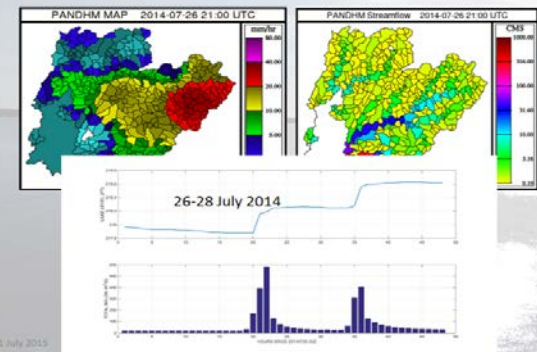
Urban Flash Flood Early Warning System

## C.1 Susceptibility Mapping



Landslide Susceptibility Mapping

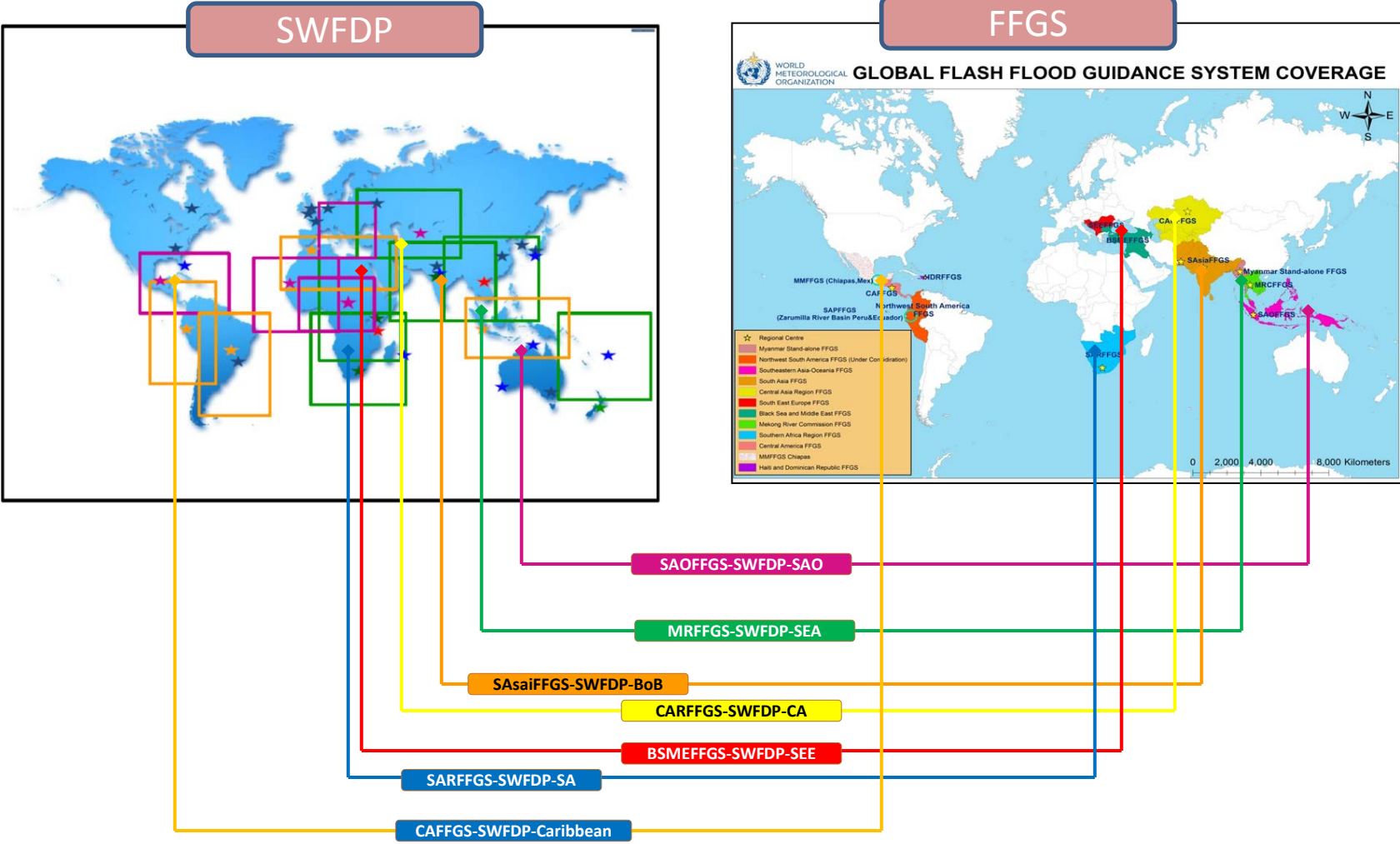
## Example Simulation Products



Riverine Routing



# Linkages between SWFDP and Regional FFGS



# Thank you

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**WMO OMM**

World Meteorological Organization

Organisation météorologique mondiale

For more information please visit:

<http://www.wmo.int/ffgs>

<http://www.hrcwater.org>